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ABSTRACT

This bimonthly bulletin reports annotations of current literature on science and public policy. Coverage includes both "policy for science" and "science for policy" in the areas of engineering, technical and narrowly specialized publications. Its purpose is to aid persons who study, formulate, or implement public policy related to science by alerting them to new additions to the science policy literature. Documents are listed under the headings of (1) General, (2) Science, Domestic Problems and National Goals, (3) Needs and Allocation of Resources for Science, (4) National R & D Programs, (5) Science, Education, and the University, (6) Science Management and Policy-Making Bodies, (7) Science, Foreign Affairs, and National Defense, and (8) Science Policy in Foreign Countries. The 92 documents are listed under one of these categories. Cross-indexing is not used. Major meetings and other events in the area are also reported. (RR)

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Science Policy Bulletin

Battelle Memorial Institute

SCIENCE POLICY BULLETIN

The Bulletin, published bimonthly, reports the current literature in the area of science and public policy. The coverage encompasses both "policy for science" and "science for policy" matters. For brevity, "science" is used to denote engineering, technology, and science.

The Bulletin is intended for individuals engaged in studying, formulating, or implementing public policy relating to science and its use. The purpose of the Bulletin is to aid such individuals by alerting them to new additions to the science policy literature.

The information presented in the Bulletin consists principally of a bibliographic listing of current publications in the area. In addition, major meetings and other events in the subject area are reported.

The bibliography, although covering a broad topical scope, is selective in that publications of a highly technical and narrowly specialized nature are excluded.

The bibliographic information is presented under a number of topical categories. Each cited publication is recorded under a single category; cross indexing is not used. The numbering of publications under each category runs consecutively through all issues of the Bulletin, so that a given number refers to only one citation.

Copies of the listed publications are not available through Battelle but can normally be obtained from the originating agency.

The contribution of information to the Bulletin as well as suggestions and comments on its content, coverage, and format are solicited. All correspondence should be addressed to:

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I GENERAL

41. Morison, R.S., "Science and Social Attitudes", Science, v. 165, no. 3889, 11 July 1969, pp. 150-156.

> "Although the general public is grateful to science for some of its more tangible benefits, it is increasingly skeptical and even frightened about its long-term results". The rising public disenchantment with science and technology is discussed, several possible reasons for the "slackening in public approval" are suggested, and some means for improving the image of science are proposed. After citing some symptoms of the disenchantment and reviewing earlier attitudes toward science, the author identifies and discusses several factors contributing to the "change of mood" of the public, including military applications of science and technology, its malevolent side effects and social costs, moral and ethical implications, and the failure to direct science "to solving problems of clear and pressing consequence to human welfare". The antipathy to science, it is suggested, may be "fallout from the growing antipathy to rational systems in general". To improve the image of science, the author calls for continuing "efforts toward educating the public", "a major effort" for bringing science and technology "under better and more obvious control", and a clarification of "the role of science in military affairs". "Science can no longer be content to present itself as an activity independent of the rest of society, governed by its own rules and directed by the inner dynamics of its own processes".

42. Kantrowitz, A., "The Test", Technology Review, v. 71, no. 7, May 1969, pp. 45-50.

> "The revolution brought about by the magnificant union of science and technology is now threatened by a massive counterattack driven ... by the very real and justified fears of the consequences of technology but perhaps still more by the unpredictability and the present lack of control of technology". Kantrowitz reviews the dimensions of this counterattack, and calls for "a mechanism for the democratic control of ... technology". He criticizes the present scientific advisory mechanism, and offers three recommendations for "increasing the

presumptive validity of the scientific input" in "mixed decisions": "Separate the scientific from the political and moral components of a mixed decision"; "Separate the judge from the advocate"; and publish the scientific judgments". Kantrowitz believes that scientists and especially technologists are unprepared to defend "their professions against the vicious attacks ... mounted against them". They must together reaffirm that science-based technology "has improved not only mankind's conditions of life, but mankind itself"; that we must "continue to foster" such technology; that the side effects of technology "can easily be met, if the will is there" by more technology; and that technology "is one of the great creative forms of our time".

43. Bronowski, J., "What We Can't Know", Saturday Review, v. 52, no. 27, 5 July 1969, pp. 44-45.

The unforeseeable social consequences of scientific discoveries and technical innovations are discussed and illustrated. "Of course, we never know with certainty what the social consequences of any discovery will be", but the "fact is that ... the side effects of technical innovation are more influential than the direct effects, and they spread out in a civilization to transform its behavior, its outlook, and its moral ethic". The effects of the invention of photographic film, mass production of automobiles, and the birth control pill are discussed as examples of the unforeseen and significant social impact of discoveries and new techniques. Although "we can foresee that certain modern technical developments will have profound social consequences", "we do not know what these are going to be". Examples in this category that are discussed include genetic control of the sex of children, desalinization of sea water, and the breeding of "a sea animal that ... harvests the sea efficiently".

44. Roche, M., "Science and the Future: American and British Associations Meet", Science, v. 165, no. 3893, 8 August 1969, pp. 619-620.

The American and the British Associations for the Advancement of Science recently met to examine "problems and issues that are likely to influence the course of science in the coming years", and to consider "future responsibilities of associations for the advancement of science". "A sense of deep concern over the changing attitude of the public and of scientists themselves toward science and technology pervaded the meeting". "Continuing advances in knowledge can be expected in the next few decades, but ... the specific nature of these advances [will] be less important than the changes expected or sought in the organizational arrangements and the social and economic conditions involved". Topics discussed included: the source and impact of advances in

scientific knowledge; the "rate of growth of science and technology [which] is slowing and ... is near the inflection point of the curve of expansion"; the negative side effects of technology; science in the developing nations; and the need for "decisions based on policy rather than on conflicting pressures and interests". Conference participants agreed on three points: "(1) The advanced and wealthy countries must give greater aid to the developing and poorer ones, ... and associations for the advancement of science should seek means to help, and sometimes to create, similar organizations in newer countries. (2) The associations should seek means ... for government leaders and others who help to determine public policy to understand the probable long- and short-range consequences of technological development, so that technology may better serve the long-range interests of society". (3) "All of the discussion was intended as advice to the governing bodies of the associations represented"; "the conference adopted no formal recommendations or statements of position".

45. Martino, J.P., "Science and Society in Equilibrium", Science, v. 165, no. 3895, 22 August 1969, pp. 769-772.

"The primary purpose of this article is to indicate that science has reached the point where science policy makers must start considering the transition to equilibrium and, in particular ... how to cushion the shocks which accompany this transition". The possible impact of this transition is analyzed with respect to the requirement for university science faculty members. "[S]cience as a component of society cannot long continue to grow at a rate exceeding the growth rate of society. The dollar resources devoted to science cannot continue to grow faster than the GNP, and the number of persons engaged in science cannot continue to grow faster than the population. Eventually science must come into equilibrium with society, and its growth rate must slow down to match the growth rate of society. When this happens, science staffs in U.S. universities will find that they are required to turn out a much smaller number of graduates, most of whom will replace losses rather than fill new posts opened by growth". Additional impacts from the transition are cited: change in the proportion of research done in universities and elsewhere; change in the age distribution of scientists; and less opportunity for advancement of younger scientists. This projection, the author indicates, is "the worst possible case. The situation in 1975 cannot help but be better ... if any forethought at all is used in developing U.S. science policy".

46. Roback, H., "Do We Need a Department of Science and Technology?", Science, v. 165, no. 3888, 4 July 1969, pp. 36-43.

A case is presented for the creation of a federal Department of Science and Technology and arguments for and against such a department are traced from the 19th century up to the present. Roback's proposal calls for the inclusion of NASA, AEC, and the National Science Foundation in the new department, as well as an oceanography agency and possibly other new activities "which have not yet found a suitable home". Factors cited as favoring such a department include the following: the missions of some agencies, such as NASA and AEC "fall almost completely in the domain of science and technology"; departments that embrace "too many ... diverse functions" become unwieldy; and reorganization "signifies changing policy" and "makes the greatest impact". The immediate advantages from the new department would be "the opportunity ... for eliminating the clutter in the Executive Office of the President", the "power and prestige" that comes with a federal department, the possibility of housing "technical agencies or bureaus which are obstacles to, or casualties of, other reorganizations", and the provision of a "better interface with the Department of Defense".

47. "DuBridge Opposes Department of Science", Scientific Research, v. 4, no. 15, 21 July 1969, pp. 9-10.

The Presidential Science Adviser, L.A. DuBridge "reaffirmed his opposition to a centralized department of science" in testimony before Rep. Daddario's Subcommittee on Science, Research, and Development. DuBridge expressed 'grave doubts' that a single science agency could "win congressional approval for funds". "He also cautioned that a departmental science agency would tend to be more concerned with its own status and bureaucratic needs than with the basic missions of its component bodies". He also opposed a new agency that would combine the National Science Foundation (NSF) with related science agencies on the grounds that it would lower the "stature of NSF and its director". Opposition was also expressed toward a "new operating agency to absorb NASA, the AEC national laboratories, the Environmental Science Services Administration, and other applied science organizations"; 'Applied science should be carried on by the agencies whose function incorporates the mission', argued DuBridge. As for an independent ocean science, he testified that it 'could be quite valuable' although he did not favor the kind of agency proposed by the Commission on Marine Science, Engineering & Resources.

48. "Science, Technology, and Public Policy During The Ninetieth Congress", First and Second Sessions 1967-68, Report of the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-first Congress, First Session, July 1969, 343 pp.

This report, prepared by the Science Policy Research Division of the Legislative Reference Service, identifies and briefly describes "highlights of legislative and executive actions that affect public policy for science and technology in the United States". The report, which is the third in this series, "focuses upon advice, decisions, and legislation which change present policies". Separate chapters of the report are devoted to two reviews of U.S. science policy (one by OECD and the other by UNESCO); research and development and national goals; protecting the environment through research, development and regulation; governing applications of science and technology; fostering the application of science and technology; national resources for science and technology; organization and administration for federal research and development; federal funds for science and technology; and science, technology, and foreign affairs. Public laws enacted by the 90th Congress relating to science and technology are cited and briefly described and a selected reference list of publications dealing with science and public policy is appended.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402).

49. Ayton, M.W., "Congressional Organization for Science and Technology 91st Congress, 1st Session", 69-157 SP, The Library of Congress, Legislative Reference Service, 11 July 1969, 41 pp.

"This report is a listing of Senate, House and Joint Committees which show a relation to scientific and technological matters. The following information is given for each committee listed: (1) committee jurisdictions which relate to scientific and technological activities; (2) committee members; (3) committee counsel and/or staff director; (4) subcommittees and the chairmen of the subcommittees".

(The report is available from the Science Policy Research Division, Legislative Reference Service, The Library of Congress, Washington, D.C. 20540).

50. "Basic Research: Its Functions and Its Future", Chemical & Engineering News, v. 47, no. 35, 25 August 1969, pp. 52-62.

This symposium, based on addresses given at the last national meeting of the American Chemical Society, discusses basic research as an intellectual activity, analyzes its functions in education and industry, and examines the federal government's

policies for its support. The four addresses comprising the symposium are summarized below.

(1) "An Intellectual Endeavor": R.S. Morison

Science is discussed as an intellectual activity that gives "man a clearer picture of himself and his place in nature" and provides the "intellectual base for the crucial choices he must make in the future". Morison notes that such activity does not have a "firm and well-recognized place in modern society", and that science is supported "only because of its practical results". However, knowledge of science is needed to deal with "some of our most important problems", a number of which science and technology itself has created. The latter has produced "disillusionment" which "is a natural result of overvaluing science for its practical application and undervaluing it as an intellectual activity". Morison calls for a return to the view that science "is one of the means for understanding the nature of man and his place in nature".

(2) "Basic Research's Role in Teaching": F.H. Westheimer

"Research and teaching are closely related: for graduate students the functions are essentially identical. Graduate student research is the core of our advanced teaching programs". The author argues that research does not interfere with teaching and that it is not implicated in the campus "ferment"; in fact, the difficulties "may lie ... in having too little research and having too few students personally engaged in discovery". Several examples and studies are cited to show how research contributes to teaching, and some suggestions are offered for improving the latter. "We need to engage the student more in learning and ... to bring more problem-solving and research to teaching".

(3) "Industrial Basic Research": A.M. Bueche

The place of basic research in industry is discussed, including the question of how much money should be spent by a company, what its aim should be, and how it should be managed. Bueche suggests that the "only legitimate distinction" between "types of technical work is that which differentiates seeking new knowledge from applying what is known". He suggests general means for determining the desired level of basic research, and the condition under which such research is useful to the company: if

"the research is good science, then chances are it will pay off". The role and management of the industrial researcher is briefly discussed.

(4) "Federal Government's Role": D.F. Hornig

Various problems in the federal support of basic research are reviewed and some remedial actions are suggested. Basic research "isn't properly appreciated" or "understood" by the executive branch and the Congress. Up to the present, science in the U.S. "has ridden on the coat tails of other objectives" (e.g., national security and education) with "the consequence that the case for basic research has to be made separately with respect to each of the nation's major objectives". Scientists have not created "an adequate constituency in the country for research". Hornig believes that "there is a general public conviction regarding the utility of research", but that the "discussion" centers around the question of "short-term vs. long-term utility", and that Congressional "reaction to a tight budget situation" is to regard "research as a deferrable item". Scientists are called on to "make a better case for basic research", "to make choices of what is good and significant in basic research", and to examine the "possibility of a large department ... for basic research and education".

51. Horowitz, I.L., "The Academy and the Polity: Interaction Between Social Scientists and Federal Administrators", The Journal of Applied Behavioral Science, v. 5, no. 3, July/August/September 1969, pp. 309-335.

The relationship of academic social scientists and "politicians", and how each views the other, is examined in the context of policy research in international relations and military affairs. The study focuses on "the problem areas key to both groups: First, the social scientists perceive problems related to (a) the financial structure of contracts and grants; (b) ... secrecy and data availability; (c) ... how government work intrudes upon the autonomy of science; (d) boundary maintenance between heuristic and normative aspects of applied research"; and (e) "the payoffs and liabilities of ... involvement in social research for the government". From the politician's view "the problems center on: (a) the excessive demands by social scientists on funds without practical utilization; (b) the absence of any system for ensuring that results obtained in research are usable ... (c) the demand for differential treatment ... than ... other government employees; (d) the "demand for ... accessibility to recommendations that tend to bypass normal political channels"; and (e) the high degree of ... supplement employment of social scientists". "[P]roposals offered for improving

the interaction ... which range from ... rupture of the two groups to a complete merger in the policy-science approach, are examined".

52. "Technology and Values", Research Review No. 3, Harvard University Program on Technology and Society, Cambridge, Massachusetts, Spring 1969, 55 pp.

"The present review deals with the relationship between technological change and value change, with emphasis on the nature of this relationship in contemporary American society". In format, the review consists of "abstracts of a small number of carefully selected books and articles ... preceded by a brief state-of-the-art essay and by summary statements covering each subcategory of titles". Following an introduction, the review is divided into two major sections, one dealing with the interaction of technology and values (with subsections on general/theoretical and the contemporary situation) and the other with value problems in a technological society (with subsections on changing value orientations, social planning and the role of the social sciences, and economic, political, and religious values.

(For information on how to obtain the report, write Irene Taviss, Harvard University Program on Technology and Society, 61 Kirkland St., Cambridge, Mass. 02138).

53. "Center for the Study of Science, Technology and Public Policy", First Annual Report, University of Virginia, Charlottesville, Virginia, 30 June 1969, 19 pp.

This is the first annual report of the Center for the Study of Science, Technology and Public Policy established at the University of Virginia. It includes three sections which discuss the concept of the program, its operations and future plans. "The Center is concerned primarily with public policy, including the study of institutions of policy formation as well as the invention and evaluation of policy alternatives". "The efforts ... are directed precisely toward the formulation of policy for emerging and future operations". The Center's operations "are divided for purposes of discussion into research, teaching and program development". Each of these are briefly discussed. The future plans of the Center "involve the initiation of two major new areas of study and a continuation of one project already near completion". The two new areas are: (1) "A program aimed at long-term involvement in a variety of studies of problems in the urban corridor in Virginia", and (2) "A study of social implications of specific advances in biomedical science and technology". The project to be continued was concerned with Nuclear Energy and World Order.

(The report can be obtained from Mason Willrich, School of Law, University of Virginia, Charlottesville, Va. 22901).

II SCIENCE, DOMESTIC PROBLEMS, AND NATIONAL GOALS

35. "Knowledge Into Action: Improving the Nation's Use of the Social Sciences", Report of the Special Commission on the Social Sciences of the National Science Board, NSB 69-3, National Science Foundation, 1969, 95 pp.

The Commission, established in 1968 by the National Science Board, "was charged with making recommendations for increasing the useful application of the social sciences in the solution of contemporary social problems". The substance of the Commission report is presented in seven parts: the first presents "examples of the uses of the social sciences and an analysis of various obstacles of their greater use"; the second suggests means by which the social sciences can contribute to the professions (education, engineering, journalism, law medicine and public health, mental health, and social health); the third "considers the relationship between social sciences and the federal government", especially the "use of social science at the White House and Cabinet level", and "the staffing of government agencies"; the next two parts discuss the social sciences in business and labor, and in community organizations; the sixth deals with improved dissemination of social science knowledge to the public; and the last part recommends the establishment of Social Problem Research Institutes, under NSF, for applied research on problems of public significance. The report recommends that $10 million be appropriated for NSF to get the institutes started in 1970; "this budget should increase in subsequent years" to establish "about twenty-five institutes" which may cost as much as $50 million annually to operate. Funding "should" be based on a "mixture of endowments, research contracts, and grants", with the federal government providing the bulk of the support.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: 75 cents).

36. "The Impact of Science and Technology on Regional Economic Development", Publication 1731, National Academy of Sciences, National Academy of Engineering, 1969, 112 pp.

This report, commissioned by the Department of Commerce and carried out by a committee of the National Academies of Sciences and Engineering, assesses 'the effects of Federal scientific and technical policies upon regional development' and recommends national policies for enhancing the effectiveness of R&D programs aimed at regional economic development. Topics covered by the report include objectives of federal policies for research, development and regional

economic growth; characteristics of regional growth; incorporation of science and technology into the economy; institutional relationships; and mechanisms for implementing regional goals in R&D. Recommendations made by the committee call for federal investment in both "distributed national goals in R&D" and "central national goals in R&D", "development and further improvement of centers of scientific and academic excellence in all major regions", establishment of "Exploratory Centers for Regional Development", "financial incentives to encourage regional planning activities", and "mechanisms for organization of compacts or commissions to design and sponsor regional programs".

(The report is available from the Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Ave., Washington, D.C. 20418).

37. "Science & Technology and the Cities", Proceedings Before the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-first Congress, First Session, 4-6 February 1969, 301 pp.

Proceedings of the 10th annual seminar with the Panel on Science and Technology are presented. The theme of the 3-day seminar was science and technology and the cities, with sessions devoted to the "urban crisis", "city planning", "urban and interurban transportation", socio-economic factors, and the application of science and technology to urban problems. The proceedings consist of several papers on these topics and related discussion, following the keynote address by John W. Gardner. (The objectives of this annual seminar are to provide technical and scientific information for the Committee on Science and Astronautics, and to improve "understanding on the part of scientists of the legislative responsibilities and processes as they relate to scientific research").

(The Proceedings can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402).

38. "State and Local Science Planning Program", News Release, National Science Foundation, Washington, D.C., 15 July 1969.

"The National Science Foundation has formalized a program to help State and local Governments develop science policies and planning. The program supports projects that develop information required for better planning for application of science and technology at the State and local levels. Preference is given to innovative approaches looking toward the development of models for Governmental use of science and technology. All activities supported must produce information of general interest to State and local Governments. The program primarily supports pilot efforts and information exchange activities and

is operated at a relatively modest financial level. State and local Governments have experienced a surge of interest in science activities in recent years, and this has been accompanied by a number of new Federal-State partnership arrangements. The NSF program is expected to reinforce the Federal-State programs of other Federal agencies by strengthening the State and local end of the partnership arrangements". "The NSF program operates within the framework of NSF's Planning Organization, headed by the Planning Director, Dr. Charles E. Falk. Extensive groundwork by the Planning Organization was carried on for two years prior to formalization of the State program, which is managed by Dr. Frank Hersman".

(For further information, contact the State and Local Intergovernmental Science Policy Planning Program, Office of Planning and Policy Studies, National Science Foundation, Washington, D.C. 20550).

39. "Science for Society: New Help for Domestic Problems", Office of Science and Technology, Department of Commerce, Commonwealth of Pennsylvania, 18 pp.

This document describes the science program of the State of Pennsylvania, in respect to its organization, activities, and plans for bringing science and technology to bear on local problems. At the government level, activities are carried out through the Governor's Science Advisory Committee and the Pennsylvania Science and Engineering Foundation (P-SEF). The roles and modes of operation of the government, academia, and business in this combined program are described. Areas to which the state program has been directed include housing, health care, new materials for industry and building, transportation, and waterways. As for funding, P-SEF "has awarded grants totalling $2.8 million for 54 different programs involving 21 Pennsylvania institutions"; some $5 million has been obtained from the federal government, industry, and other institutions for additional support. Currently, P-SEF has joined with the National Science Foundation to establish "a center for the study of State science policy". This center will evaluate State science programs and "serve as a clearinghouse for information and later a source of policy recommendations available to all states".

(The report can be obtained from Mr. R.E. Hansen, Office of Science and Technology, Pennsylvania Dept. of Commerce, 225 Pine St., Harrisburg, Pa. 17101).

40. "Administration Proposes Mass Transit R&D", Washington Science Trends, v. 22, no. 18, 11 August 1969, p. 103.

"The Nixon Administration has proposed a $500 million program over the next 12 years for research and development as part of

a larger program to make public transit 'an attractive choice' for owners of private cars. 'The Nation which has sent men to the Moon', the President declared in a special message, 'would demonstrate that it can meet the transportation needs of the city as well'. Mr. Nixon spoke against a background of a declining urban transportation system, accompanied by a rise in population and the 'strangulation' of the central cities. But his proposal, which included $9.5 billion for capital investments in addition to R&D, disappointed many urban authorities". "They expressed dismay that there was no 'trust fund' arrangement which would earmark funds specifically for mass transit, and said this would leave them subject to the whims of Congressional appropriations. The experiences of efforts to upgrade ground transportation between cities may lend some credence to such complaints. Congress has constantly held back on funds for many of the programs initiated or proposed by the Office of High Speed Ground Transportation".

41. Quade, E.S., "The Systems Approach and Public Policy", P-4053, (AD 685 126), The RAND Corporation, Santa Monica, California, March 1969, 29 pp.

The nature of the "systems approach" and how it is currently practiced is briefly discussed, and changes necessary for it to be effective in dealing with the public policy aspects of social-urban problems are prescribed. The changes called for are: (1) an enlarged concept of "model" which will allow opinion and value to enter into "problems with a high social and political content"; (2) methods of analysis that can be used in situations "with many decisionmakers and diffuse authority" and which take into account the environment in which the analysis must be implemented; (3) incorporation of the systems approach with the policymaking process so that recommendations of the former are automatically considered; and (4) adequate support for a strong analytic capability in independent research institutions. In conclusion, the author cautions that "unless an effort is made to overcome the analysts' bias toward quantitative and mathematical models, we may find the more elusive political and social aspects neglected, improperly weighted, or even deliberately set aside".

(The report can be obtained by writing the author at The RAND Corporation, Santa Monica, California).

42. Vaughn, C.L. (Ed.), "Systems Approach to Social Problems", Proceedings of the Sixth Management Conference on Marketing in the Defense Industries, 21 May 1968, 138 pp.

The problems and prospects of applying system analysis to social-urban problems are discussed in this conference. "Perhaps

the most interesting point that came forth from the conference was that not all skills developed by defense and aerospace companies are transferable to the socio-economic field. It is clear that industry's past experiences are not all relevant in solving the extremely complex socio-economic problems". Papers presented at the conference include:

- "The Systems Approach in Social Legislation": R.L. Chartrand
- "Politics, Planning and Procurement": A.W. Barber
- "The Private Firm as Project Manager of an Urban Renewal Project": S.I. Doctors
- "Business and Urban Affairs": W.E. Zisch
- "Capabilities Needed to Participate in Socio-Development Programs": C.C. Halbower
- "On Systems Methods Applied to the Needs for Social Change": F.S. Burrell
- "Problems and Techniques in Social Systems": C. DeCarlo
- "An Aerospace Systems Company Looks Into the Problems of the American Indian": W. Abraham

(The report can be obtained from C.L. Vaughn, Bureau of Business Research, Boston College, Chestnut Hill, Mass. 02167, Price: $10.00).

43. "Toward Master Social Indicators", Research Memorandum ERPC 6747-2, Educational Policy Research Center, Stanford Research Institute, February 1969, 52 pp.

An approach to devising social indicators for use in "social accounting" is presented. A "heuristic model for categorizing indicator concepts" is developed, one element of which relates to the individual and the other to the social system. The "interrelationship of goals, indicators, and attainment levels" are discussed "to show that values are an integral part of any indicator system" and that values "can be hierarchically ordered". The developed schema is then used, in conjunction with the HEW study, "Toward a Social Report" (see Science Policy Bulletin, April 1969, p. 10), in an unsuccessful attempt to "yield some kind of 'social account'" with respect to health, opportunity, environment, standards of living, public safety, democratic values, and learning, science, and culture. "Failure of the foregoing effort ... led to a more fundamental approach to making operational a national social data system consonant with the heuristic model"; this consists of a brief discussion of the requirements of such a data system and some of its advantages.

(The report can be obtained from the Stanford Research Institute, Menlo Park, Calif. 94025).

44. Gruber, W.H. and D.G. Marquis (Eds.), Factors in the Transfer of Technology, The M.I.T. Press, 1969, 289 pp.

This book contains the proceedings of the Endicott House Conference on The Human Factors in the Transfer of Technology. The presented papers, divided into three sections, are cited below:

I. Innovation: The Development and Utilization of Technology

Models, Images, and Myths - T. Burns
Innovation and the Problem of Utilization - S. Toulmin
The Development and Utilization of Technology in Industry - W.H. Gruber
The Role of Achievement Orientation in the Transfer of Technology - D.C. McClelland

II. The Process of the Development of Technology

The Structures of Publication in Science and Technology - D.J. de Solla Price
Human Factors at the Science-Technology Interface - H. Reiss
Science-Technology Coupling: Experience of the Air Force Office of Scientific Research - W.J. Price, W.G. Ashley, and J.R. Martino
The Differential Performance of Information Channels in the Transfer of Technology - T.J. Allen
Project Hindsight: An Empirical Study of the Sources of Ideas Utilized in Operational Weapon Systems - R.S. Isenson

III. Government Influences on the Diffusion of Technology

Effect of Government R and D Contracting on Mobility and Regional Resources - A. Shapero
The Effect of Government Funding on Commercial R and D - G. Black
Entrepreneurship and Technology - E.B. Roberts
Government Efforts to Facilitate Technical Transfer: The NASA Experience - P. Wright

A summary paper integrates the findings of the conference, examines the policy consequences that follow from these findings, and points out the "critical unknowns" of technology transfer.

45. Carter, L., "Environmental Quality: Nixon's New Council Raises Doubts", Science, v. 165, no. 3888, 4 July 1969, pp. 44-46.

The new interagency Environment Quality Council established by President Nixon is critically discussed and alternative

advisory apparatus proposed by Congress are reviewed. President Nixon created the cabinet-level council by executive order in late May; he named himself chairman, Vice President Agnew vice chairman and Lee DuBridge executive secretary. The purpose of the council is to "review existing policies and programs, project the environmental impact of new technologies, and 'encourage scientific developments which will help us protect our resources'". Critics point out that the "record of accomplishment" of such interagency councils "has been small", and that the President and cabinet cannot "devote the necessary time to this problem". Alternative mechanisms for securing advice on environmental policy include Sen. Muskie's proposal for an Office of Environmental Quality in the executive office of the President, and Sen. Jackson's bill which calls for a three-member council on environmental quality analogous to the present council of economic advisers.

III NEEDS AND ALLOCATION OF RESOURCES FOR SCIENCE

30. "R&D In the Aircraft and Missiles Industry 1957-68", NSF 69-15, National Science Foundation, Washington, D.C., May 1969, 17 pp.

This report presents statistical data and background information regarding R&D in the aerospace industry. This includes trend data over the 1957-68 period, the employment and salaries of scientists and engineers, federal financing, company R&D programs, major R&D costs, and R&D as a percent of sales. In 1967, the industry spent a record $5.6 billion for R&D; this "amounted to 34 percent of all industrial spending for R&D ... and represents a 116-percent increase from the 1957 level of $2.6 billion". Of the total, 80 percent is supported by the federal government. The industry employs over 100,000 R&D personnel, which constitutes 27 percent of all R&D scientists and engineers in industry. The "ratio of total R&D spending to net sales ... averaged 21.5 percent" as compared with 3 percent for companies in all other manufacturing industries combined. Although companies in the industry "devoted only 1 percent of their total R&D funds to basic research compared to 5 percent for all other industries, they accounted for 11 percent of all the basic research carried out by industrial firms".

(The report is available from the U.S. Government Printing Office, Washington, D.C. 20402, Price: 40 cents).

31. "The NSF Budget", BioScience, v. 19, no. 8, August 1969, p. 738.

"Following the authorization hearings for the National Science Foundation, the House Subcommittee on Science, Research, and Development, under the chairmanship of Representative Emilio Daddario (D-Conn), cut the Nixon Administration's request of $500 million by just over $9 million. The cuts were made in multidisciplinary research ($4 million), the National Register of Scientists and Engineers ($245,000), improvements planned for the Arecibo, Puerto Rico, radio telescope ($3.3 million), and construction of a new oceanographic research vessel ($2 million). An NSF program designed to assist state and local governments in applying modern technology to the solution of local problems received a boost of $150,000. The final bill included $249.3 million for research and $117.5 million for science education. The biological sciences were allotted an increase of $1.4 million over fiscal year 1969". "When the NSF appropriation bill was reported and brought to the floor by the House Appropriations Committee, the

amount had been reduced still further to $418 million". An "amendment offered by Representative Robert Giaimo (D-Conn) which would have restored $33 million to the final appropriation was defeated. The NSF appropriations bill passed the House as reported by the House Appropriations Committee". "Between the time the Daddario Subcommittee report was issued and the House debate, the Senate Committee on Labor and Public Welfare considered the NSF authorization and adopted none of the cuts instituted by the Daddario group but did maintain the $150,000 recommended for use in local problems".

32. "A New Trend on Financing Research?", Scientific Research, v. 4, no. 17, 18 August 1969, p. 17.

"When the Senate Committee handling the National Science Foundation's budget authorization okayed the NSF's request for $500 million last month ... it took a step that some observers consider potentially significant for governmental support of science in the 1970's. The Committee authorized the Foundation to spend twice as much as it had requested for its new program to help the 50 States exploit science and technology. The Foundation had asked a modest $150,000 for the program for the new fiscal year, but the Senate Labor & Public Welfare Committee doubled the amount to $300,000 -- still modest, but the only increase for any NSF program. [K]nowledgeable Washington observers say the move marks the beginning of a trend in which the States will be given more and more federal funds to spend as they wish for research on their social, economic, and other problems. Right now, the NSF is limiting itself to exploring how the States can make the best use of federal funds and services in science and technology". "The program's director, ... Frank Hersman, kicked the program off last year with a study of the science-policy apparatus in Tennessee. Other studies underway: the effect of federal science support on 12 public universities in Michigan (due out this month); science's potential role in solving social and economic problems in the coastal plains of North and South Carolina and Georgia; and creation of a center for the study of science policy at Pennsylvania State University".

33. Walsh, J., "Senate Imposes CBW Limitations, Cuts Defense Research", Science, v. 165, no. 3865, 22 August 1969, p. 778.

"The Senate unanimously passed an amendment restricting Defense Department activities in chemical and biological warfare (CBW), sliced $45 million from the defense research budget, and took steps which reflect congressional intention to exercise closer control of the military. The CBW amendment does not affect CBW spending but, rather, imposes controls on the transportation, storage, and disposal of chemical and biological agents". "The bill still authorized a total of

some $297 million for CBW weapons and research". The $45-million cut from defense research "called for reductions in several areas of research, including foreign-area social sciences research". An amendment introduced by Sen. Fulbright and passed by the Senate included the following provisions: (1) "A $77-million cut in funds for federal contract research centers", (2) "A reduction of $2 million for research done in foreign institutions, and a cut in other behavioral and social sciences research of another $3 million", (3) "A $5-million cut in Project Agile counterinsurgery research", and (4) "A cut of $8 million from Project Themis", leaving $21 million.

34. "Needed: Unified Info System", Nuclear News, v. 12, no. 8, August 1969, pp. 23-24.

Proceedings of the National Engineering Information Conference held on June 24-25, 1969, and sponsored by the Office of Science and Technology, are summarized in this article. The conference focused on the need for improving the present scientific and technical information system, and on means for doing so. Congressman E.Q. Daddario "expressed concern over the pitiful amount of progress that has been made in developing a national information handling system. He said there have been too many reports, but not enough action", and warned that if "corrective action is not taken in the near future to set up such a system, less responsible groups may soon take it upon themselves to do so". "Throughout the conference, the importance -- and the responsibilities -- of technical and professional societies were stressed". Other topics discussed included the role of for-profit information handling organizations, the financial support needed for such a system, information programs currently in use in the government, and plans for new information systems.

35. "The President's Population Message", Science News, v. 96, no. 4, 26 July 1969, p. 82.

"President Nixon last week proposed a research effort in domestic population growth and family planning, emphasizing demographic studies rather than biological research. In a message to Congress, the President proposed the creation of a Commission on Population Growth and the American Future to study American population growth and migration trends, make policy recommendations, suggest alternatives and help educate the public. President Nixon asked that the commission be established for two years so that it may make use of the 1970 census data; an interim report would be expected at the end of one year. On a broader scale, the President also asked the Secretary of State and the Agency for International Development to give population and family planning problems high priority".

36. "National Fire Research Program Stalled by Budget Cuts", Washington Science Trends, v. 22, no. 16, 28 July 1969, pp. 91-92.

> "An ambitious program to help reduce the death and destruction of fire in the U.S. through application of modern technology faces an uncertain future due to White House and Congressional budget restraints. Federal officials had hoped to receive financing for a broad program of research, improved statistical information, demonstration projects, education and training. Fire authorities testified that the U.S. has the "poorest fire record of any major nation" with estimated 1968 deaths of some 12,000 and perhaps 200 times that number of injuries, plus an estimated direct property loss of $2 billion". "A Fire Research and Safety Act was signed into law in 1968, but has received only minor funding. In addition, the White House has never named any members of an authorized National Commission on Fire Safety and Control. The powerful House Appropriations Committee this past week voted no funds at all for the National Commission, and left it up to the National Bureau of Standards to determine what available funds would be allocated to the remainder of the fire program".

37. "Intense Research on Aging Urged", Scientific Research, v. 4, no. 14, 7 July 1969, p. 19.

> "A possible breakthrough toward a larger national commitment to gerontological research came recently when identical bills were introduced in the Senate and the House to establish a five-man research commission on aging. The commission would study existing data on the biological aspects of aging and design an intensive five-year research program". "The bills call for the commission to submit its gerontological research plan to both the President and Congress a year after it is formed. The members, who would be appointed by the President, would include two biological scientists, a behavioral scientist and a physician". "Sen. Harrison Williams introduced the Senate; the House bill was introduced by Rep. Alphonzo Bell". No hearings have been scheduled on either bill. "The three main obstacles hindering gerontological research in the U.S. have been lack of funds, lack of a unified program, and lack of enough interested scientists. Current federal expenditures for basic research on aging amount to $7.4 million annually".

38. "Arecibo: A Radio Telescope in Limbo", Scientific Research, v. 4, no. 17, 18 August 1969, pp. 11-12.

> "The giant Arecibo radio-radar telescope in Puerto Rico ... is a tragic example of what can happen when sponsorship of a project moves from a mission-oriented to a nonmission-oriented federal agency". The construction and operation of the telescope

was funded by the Advanced Research Projects Agency of the Department of Defense (DOD). But congressional pressure on DOD "to spend its r&d money on defense-related research led to the ... decision to transfer support of Arecibo to the National Science Foundation this October". "Unfortunately the NSF cannot afford the radio telescope either ... NSF is also under pressure to assume its new mission to support applied research on social problems, while at the same time trying to fill its original mandate to support basic research and science education". "While the NSF has been stymied in getting capital funds for Arecibo, it has begun to share the operating costs of the telescope, putting up some $900,000 in fiscal 1969. Of Arecibo's fiscal-1970 budget, the NSF intends to contribute $1.2 million; another $600,000 will come from ARPA for ionospheric studies. In fiscal 1971, however, ARPA will contribute very little, and after that ARPA and the Foundation will 'play it by ear'". It "is apparent that with a massive budget cut looming for NSF, the Foundation will have to rearrange its priorities -- and it isn't at all clear where Arecibo stands on the priority list".

39. "House Tax Plans Alarm Foundations", Scientific Research, v. 4, no. 15, 21 July 1969, p. 11.

"Congressional proposals of federal tax reform on charitable foundations threaten not only to cut the foundations' funds for scientific research grants but also to curtail their authority to select their own grantees. The two provisions most odious to foundations that sponsor research are the proposed 5 percent tax on income and the ban against grants to individuals. Officials at several foundations said they were especially disturbed over the proposed restriction on grants to individuals". "Normally, the foundations select individual grantees -- often persons whom they have encouraged to apply for grants -- and then work closely with them on all aspects of their projects. Under the proposal of the Ways & Means Committee, some foundation officials fear the universities would not only do the selecting but might try to insert themselves in an unacceptable manner between grantor and grantee".

IV NATIONAL R&D PROGRAMS

39. "A Critical Review of the Marine Science Commission Report", Program of Policy Studies in Science and Technology, The George Washington University, January 1969, 94 pp.

This publication contains the proceedings of a symposium organized to review the report Our Nation and the Sea: A Plan for National Action, which was released by the Commission on Marine Science, Engineering and Resources in January 1969. The "experts" assembled for this purpose comment on the extent to which the report is "accurate, fair, sensible and/or possible". Individual sections of the symposium deal with (1) The Marine Science Commission and its Report, (2) Executive Department Ramifications, (3) Economic and Investment Implications, (4) The National Marine Commission and Fish, (5) Petroleum and the Continental Shelf, (6) Hard Mineral Mining and the Marine Science Commission Report, and (7) Practical Problems of Implementation or Parliamentary Pitfalls. Issues examined by the symposium include the governmental reorganization proposed by the report that would combine atmosphere and ocean-related activities, administration of the program, choice of programs to be funded, governmental attitudes toward resource development, and the legal aspects of the management of the coastal zone.

(The report can be obtained from the Program of Policy Studies in Science and Technology, The George Washington University, Washington, D.C. 20006).

40. Padelford, N.J., "Alternatives for Ocean Policy", Technology Review, v. 71, no. 9, July/August 1969, pp. 31-37.

This appraisal of the Marine Science Commission report, Our Nation and the Sea: A Plan for National Action, concludes that it offers useful guidelines for sea development but contains debatable suggestions for international control. The author presents the major recommendations of the report and suggests "two areas in which the Commission's recommendations may be questioned". "One of these is the suggested redefinition of the continental shelf"; the formula offered by the Commission "would deprive states of rights which they now enjoy under the 1958 Geneva Convention on the continental shelf ... and give an international body the right to make money by granting exploratory and exploitation leases ... to nationals of the state itself, as well as to foreigners, in vital security areas off their own shores". A second area of question is in connection with

the proposed International Registry Authority to "register national claims for exploring and exploiting areas of the deep sea bottom beyond the redefined continental shelf". This provision "would allow alien parties to become lodged on our doorstep regardless of local security or economic interests". In addition to these points, the author questions the feasibility of establishing the new federal department proposed by the Commission, and deplores the "delay of the Nixon administration in responding to the ... Commission report".

41. "Marine Research Fiscal Year 1968", A Catalog of Unclassified Marine Research Activities Sponsored During FY 1968 by Federal and Non-Federal Organizations, Executive Office of the President, National Council on Marine Resources and Engineering Development, July 1969, 740 pp.

This report, prepared by the Science Information Exchange of the Smithsonian Institution, is a comprehensive inventory of Federal and non-Federal organizations with ocean-related research programs and interests. "It contains descriptive summaries of 2,589 unclassified projects which were funded, either for the first time or as continuing efforts, during the fiscal year. Associated with these projects, and identified by name and address are 3,022 investigators; 457 contractors; 25 Federal supporting agencies; and 95 non-Federal sources of support". "The projects referenced.... cover basic and applied research on the marine environment and its resources". The contents are organized around 12 headings: properties of water, water motion, meteorology, survey and prediction, living systems, public health and safety, marine geology, engineering and technology, coastal zone management and use, legal studies, education and training, and facilities. Subject, principal investigator, contractor, and supporting agency indexes are included.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: $5.50).

42. "United States Aeronautics & Space Activities, 1968", Executive Office of the President, National Aeronautics and Space Council, Report to the Congress from The President of the United States, January 1969, 116 pp.

The nation's activities, accomplishments, and programs in the aeronautics and space field are summarized in this "status report" for 1968. Separate chapters present the activities of the various federal departments and agencies in the field, including those of NASA, Department of Defense, Atomic Energy Commission, Department of State, National

Science Foundation, Department of Commerce, Department of Transportation, U.S. Information Agency, and the Arms Control and Disarmament Agency.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: $1.25).

43. "Report Urges Unmanned Space Probes", Science, v. 165, no. 3893, 8 August 1969, p. 570.

"A National Academy of Sciences (NAS) panel, consisting of 23 leading space scientists, urged this week that a series of unmanned planetary and outer space explorations be planned for the 1970's. In a report that was approved by the NAS Space Science Board, the panel estimated that such unmanned flights would be far less costly than NASA's present manned program and would reap valuable scientific information on the origin of the universe and the nature of the earth's own atmosphere. Specifically, the report recommends, in order of their scientific importance, the following series of missions: Jupiter deep-entry probe and flyby (1974); Jupiter orbiter mission (1976); Jupiter-Saturn-Pluto grand tour (1977); Jupiter-Uranus-Neptune grant tour(1979); Jupiter-Uranus entry probe missions (early 1980's). The NAS committee, chaired by James Van Allen of the University of Iowa and Gordon MacDonald of the University of California, stressed that the 1970 decade will present a rare opportunity for solar scientists to observe the planets in a line-up formation that occurs about once every 200 years. The report specifically recommends that NASA submit to Congress in 1971 a budgetary plan for a long-term solar system exploration".

(The report, The Outer Solar System: A Program for Exploration may be obtained at no cost from the Space Science Board, 2101 Constitution Ave., N.W., Washington, D.C.).

44. Mueller, M., "Trouble at NASA: Space Scientists Resign", Science, v. 165, no. 3865, 22 August 1969, pp. 776-779.

Three top space agency scientists and a scientist-astronaut recently resigned from NASA. The factors behind these resignations are discussed. "The resignations, which NASA officials say represent a 'serious loss' to the agency, occur[red] at a time when there is an undercurrent of dissatisfaction among scientists in general over NASA's alleged neglect of important pure science research goals in favor of engineering pursuits and the more glamorous technical aspects of space exploration. But the reasons for the resignations ... are complicated and seem not to be based on a single motive of disenchantment with NASA policies". Some of the expressed reasons for resignations included: (1) "dissatisfaction with the role of basic science

in space exploration and impatience with NASA's management of scientific projects"; (2) "they [the scientists] feel more at home in their natural habitat, the university" and are "lured by the prospects of new, promising positions that offer them more time to devote to their own research"; (3) "the space agency's main problems are inadequate manpower for keeping track of the scientific programs, insufficient funding by Congress, inadequate long-range planning, the juxtaposition of scientific goals and political and engineering interests, and lack of understanding of scientific goals at the management level in NASA".

45. "International Biological Program", Hearings Before the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-first Congress, First Session, 6-7 May 1969, [No. 1], 193 pp.

These hearings "are designed to discuss" the House Joint Resolution 589 for support of the International Biological Program (IBP). In introducing the hearings, Rep. E.Q. Daddario stated, that the "IBP is not just another Government venture, and it is not some abstract international dream. It is a very real, planned, and coordinated effort to establish an ecological base for the management of our environment and for the prevention of the deterioration which is threatening our entire planet. It may be one of the most crucial programs ... to evolve in our time". The hearings include statements by W.F. Blair (Chairman, U.S. National Committee for the IBP), H.J. Carlson (Chairman, Federal Intergovernmental Coordinating Committee on the IBP), L.A. DuBridge, and N.E. Gibbons (Canadian Committee, International Biological Programme), as well as an analysis of the needs and objectives of the IBP (prepared by NSF), "Views of a U.S. National Committee of the IBP Conference", and a summary and evaluation of the IBP grasslands ecosystem progress report and proposal.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402).

46. "Global Atmospheric Program Proposed", Washington Science Trends, v. 22, no. 14, 14 July 1969, pp. 79-80.

The National Academy of Sciences recently released proposals which "could lead to a world-wide meteorological observation system and the possibility of achieving accurate long-range weather prediction. The proposals represent the latest plan for U.S. participation in the Global Atmospheric Research Program (GARP) -- including endorsement of a full-scale 'global experiment' to be carried out five years from now". "The latest study, calling for a five-year program, includes no cost estimates because of the many 'options' and 'milestones' at which program choices can be made. Government agencies will be reviewing this new proposal, with a

more detailed plan expected by the end of the year. The Academy report points to the 'extremely encouraging developments' which have occurred since the feasibility of such a program was originally explored". Now, 'it is possible, in theory, to make useful forecasts of the daily sequence of large storm systems and other major weather features for the period of two weeks or perhaps longer'. The proposed U.S. effort, to be combined with that of other nations, includes "observing systems simulation experiments", "global observing system Pacific", "tropical cloud cluster experiment", "convection and boundary layer experiment", and "numerical modelling experiments". The study report concludes: 'GARP with its objective of attaining economically useful long range weather prediction, represents the next step in man's effort to predict the weather and eventually to modify it for his own uses'.

(For further information contact U.S. Committee for Global Atmospheric Research Program, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418).

V SCIENCE, EDUCATION, AND THE UNIVERSITY

46. "Institutional Grants Bill", Hearings Before the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-first Congress, First Session, February 1969, 351 pp.

> The aim of the bill (H.R. 35) is to "promote the advancement of science and the education of scientists through a national program of institutional grants to the colleges and universities of the United States". This document presents the bill, associated hearings, and a summary of the witnesses' views of the bill. The issues and topics discussed include the education needs for Federal support, the possible adverse effect the bill might have on other sources of support, institutional vs. project grants, methods of financing (several witnesses preferred direct student assistance), the intended scope of the bill, results that H.R. 35 would have upon the educational institutions, characteristics of H.R. 35 formula, and the effect upon the quality of education.
>
> (The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402).

47. Boffey, P.M., "Draft Caused Drop in Graduate Science Enrollments", Science, v. 165, no. 3889, 11 July 1969, p. 162.

> "The draft caused a pronounced drop in graduate science enrollments in the fall of 1968 and then caused still further attrition during the school year, according to two recent surveys". "Preliminary estimates reported by the U.S. Office of Education ... indicated that first-year male graduate enrollments for the fall of 1968 in nine academic and professional fields surveyed dropped about 5.6 percent, engineering 1.8 percent, and physics less than 1 percent. Law and history showed the biggest drops -- better than 12 percent each -- while medicine, which still provides draft deferral, and business showed slight increases". "In order to assess the situation at the close of the 1968-69 academic year, the Scientific Manpower Commission ... conducted a survey of departments granting the Ph.D. in chemistry, physics, and psychology. This survey indicated that 15.4 percent of the first-year male students and 11.8 percent of the second-year men had either entered service or been ordered for induction prior to June 1969". "Many department chairmen complained that the survey did not adequately measure the full loss ... it did not count those students who dropped out of school to seek jobs that might qualify for occupational deferment, those who changed from

full-time student status to full-time teaching status ... those whose local boards had promised induction notices during the summer, and those who had accepted graduate appointments for next fall but then withdrew because of the draft". "The outlook for the next academic year -- barring a change in the draft laws or the war situation -- is bleak".

48. "Space Consortium Created", Science, v. 165, no. 3893, 8 August 1969, p. 570.

"The Universities Space Research Association (USRA), a national consortium of 48 universities, was organized on 16 July by the National Academy of Sciences to foster cooperation in space research among universities, research organizations, and the government. The USRA is slated this fall to take over the management of NASA's Lunar Science Institute in Houston, which is temporarily under the direction of the National Academy of Sciences. The Lunar Science Institute provides a base for outside scientists who wish to conduct space science research in Houston, particularly at the Lunar Receiving Laboratory at NASA's Manned Spacecraft Center. The USRA has plans to operate other laboratories and research and educational centers in the future".

49. "Seminar for Science Policy Group", Science, v. 165, no. 3891, 25 July 1969, p. 378.

"About 100 people met in Washington [in July] for the first special symposium organized for university researchers by the Science and Public Policy Studies Group. The 3-day meeting was devoted largely to appearances by representatives of public agencies with science policy interests and gave the visitors opportunities for off-the-record, off-the-cuff discussions with federal officials. The idea of the Science and Public Policy Studies Group grew out of a symposium and workshop meetings at the AAAS meeting in 1967 for persons who were actively engaged in teaching or research programs in science policy studies, or were contemplating such work. The group was organized formally in 1968 to provide a national focus for academic studies in the science policy field, to organize symposia, and to serve as a clearinghouse for information. A small office was set up at M.I.T. under the supervision of professors Eugene B. Skolnikoff and Harvey M. Sapolsky. So far, about 90 institutions have become affiliated with the group. Support for the group's activities has come from a grant from the Sloan Foundation, and contributions of $1000 a year each have come from 15 of the university affiliates. Last week's meeting was the first major independent venture by the organization and the first of a planned series of Washington seminars".

50. "Center to Study Science-Society Ties", Scientific Research, v. 4, no. 14, 7 July 1969, p. 18.

> "A new study center dedicated to improving the relationship between science and technology on one hand and society's needs on the other has begun operations at the State University of New York campus here. Called the Center for the Study of Science & the Future of Human Affairs, it will bring together social and natural scientists for a concerted, collaborative attack on technological and societal problems on the local, state, national, and international levels. The director of the center is Victor Rabinowitch, former director of developing-country programs in the office of the foreign secretary of the National Academy of Sciences". "The Center, for which preparatory work began a year ago, will ultimately have a staff of 15 to 20 professionals supplemented by visiting professors. 'Our interests include all the interfaces of science and society, including the uses and misuses of science, questions about the establishment of priorities in scientific research, and related subjects'".

51. "House Antiriot Provision", Science, v. 165, no. 3894, 15 August 1969, p. 677.

> "The House on July 31 approved a mild 2-part campus antiriot amendment attached to an HEW appropriations bill. A provision similar to last year's rider would provide that federal aid be cut off to students engaged in serious college disruptions. A new provision would bar federal aid to institutions that fail to punish rioters. As was the case last year, no provision is made in the bill to enforce either measure; the House Appropriations Committee earlier failed to pass a provision that would have designated the Secretary of HEW to set institutional guidelines for enforcement".

VI SCIENCE MANAGEMENT AND POLICY-MAKING BODIES

41. "Technology: Process of Assessment and Choice", Report of the National Academy of Sciences, Committee on Science and Astronautics, U.S. House of Representatives, July 1969, 163 pp.

The needs, problems and mechanisms for "technology assessment" are examined in this report by an ad hoc panel of the Committee on Science and Public Policy of the National Academy of Sciences. The study, which was undertaken at the request of Representative E.Q. Daddario, concentrates "on the structuring of the problem and on the design of an organizational framework for the technology-assessment function within the federal government". Individual sections of the study deal with the nature of the problem, the existing processes of assessment, the problems and pitfalls in assessment (including the conceptual and institutional constraints), and with general approaches and recommendations for performing the function. The study concludes that "mechanisms for technology assessment beyond those currently operating are clearly needed"; the present systems are "too fragmented and uncoordinated, too lacking in professionalism, continuity, and detachment". The "panel urges the creation of a constellation of organizations, with components located strategically within both political branches, that can create a focus and a forum for responsible technology-assessment activities throughout government and the private sector".

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: 75 cents).

42. Kasper, R.G. (Ed.), "Technology Assessment: Proceedings of a Seminar Series", Program of Policy Studies in Science and Technology, The George Washington University, July 1969, 164 pp.

This document contains the proceedings of a seminar series on Technology Assessment held at The George Washington University over a period in early 1969. At each session "the author of a prepared paper moderated about two hours of discussion among the participants" who represented academic, industrial and governmental organizations. The first paper, "Assessment Information Systems", presented by Clarence Danhoff, "called attention to some of the problems involved in obtaining the information necessary for the assessment function to proceed. The role of the technical expert and role of the public were considered at some length in the paper and the ensuing discussion". Richard A. Carpenter presented the second paper, "Technology Assessment

and the Congress". "It considered the needs of the Congress and the present role of the Legislative Reference Service in fulfilling some of those needs". Harold P. Green followed with a discussion of the "Adversary Process in Technology Assessment". The paper considered a "proposal to establish an organization whose purpose would be to determine and publicize the detrimental aspects of technological applications". "Finally, Louis H. Mayo considered 'The Management of Technology Assessment'. He stressed his view of the total problem approach to technology assessment and once again the discussion covered numerous topics". Summaries of the major points raised in the discussion sessions are included with the formal presentations.

(The report can be obtained from R.G. Kasper, The George Washington University, Washington, D.C. 20006).

43. "Technical Information for Congress", Report to the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, Ninety-first Congress, First Session, 25 April 1969, 521 pp.

"The purpose of this study is to shed light on the processes by which the Congress secures information from the scientific or technological community in order to decide political issues with a substantial scientific or technological content". The study, prepared by the Science Policy Research Division of the Library of Congress, examines several technical areas and programs in which Congress was involved, and extracts from the discussion of these cases some of the salient aspects, needs, and mechanisms for collecting, analyzing, and applying technical information for political decision-making. The fourteen cases selected for study include Project Mohole, high-energy physics, the Salk vaccine, Project Camelot, thalidomide, and the test-ban treaty. The information obtained from these case studies was then used to answer the following questions: "How are scientific issues brought to the Congress and how does the manner of their presentation influence the outcome?"; "What information from what sources ... was received ... and how did it influence the outcome?"; "What institutional decisionmaking method was employed in the Congress for each issue, and how did the method of decision influence the outcome?"; "What was the outcome of each issue, both in terms of the values expressed at the time of decisionmaking, and in retrospect -- as judged by the values of the present day?".

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: $2.25).

44. "Nixon Science Leadership Lacking", Industrial Research, v. 11, no. 8, August 1969, pp. 31-32.

"President Nixon's 'honeymoon' with the scientific community rapidly is drawing to a close". Some of the incidents leading to this, and possible reasons for them, are cited and briefly discussed. The 'Long Affair', in which Frank Long "was bypassed for the directorship of the National Science Foundation due to his anti-antiballistic missile ties", and the "11th hour rejection" of John Knowles for assistant secretary of the Department of Health, Education & Welfare, are presented as the two major incidents leading to the end of the 'honeymoon'. The "standard reason" offered for Nixon "knuckling in" to "conservatives is his need to pick up votes on such crucial issues as the ABM and extension of the surtax". "An even more important reason, however, may be Nixon's reluctance to make major moves in any field -- especially science -- until after the commission on government reorganization ... makes its recommendations late this year". Relatedly, the "Marine Commission report recommending a new National Oceanic & Atmospheric Agency has been put on the shelf for now as the reorganization group ponders the broader question of a new Dept. of Natural Resources".

45. "How the President Gets His Science Advice: A Visit to OST", Physics Today, v. 22, no. 8, August 1969, pp. 70-71,73,75.

Some of the "elaborate machinery" established to provide scientific advice for the federal government is described and briefly discussed. The article focuses on three parts of this machinery: the Office of Science and Technology (OST), the Federal Council on Science and Technology (FCST), and the President's Science Advisory Committee (PSAC). Each of these are briefly described in terms of its functions and duties, its mode of operation, and its composition. Heading each of these is the President's science adviser, Lee A. DuBridge who "considers himself to be exactly what his title implies -- an adviser to the President -- rather than a special pleader for science". The history of OST is briefly recounted, the areas of specialization of its staff (over 20) are listed, and the types of activities undertaken are illustrated. The FCST, which is composed of the heads of federal departments and independent agencies, coordinates federal science activities and considers policy questions cutting across the departments. The PSAC works through a system of "panels concerned with particular subjects".

46. "Federal Council for Science and Technology 1968 Annual Report", Office of Science and Technology, Executive Office of the President, 1969, 32 pp.

Activities of the various committees and panels of the Federal Council for Science and Technology (FCST) are briefly described

in this annual report. This includes the activities of the committees on Academic Science and Engineering, Atmospheric Sciences, Environmental Quality, Federal Laboratories, High Energy Physics, International Affairs, Materials Research and Development, Patent Policy, Scientific and Technical Information, Solid Earth Sciences, and Water Resources Research. The Council itself "considered an array of administrative matters, budgetary issues, and general policy questions", for example, inventory and management of laboratory equipment, guidelines for support of research outside the U.S., establishment of a Committee on Environmental Quality, adverse consequences of technological innovation, and the operation of Project THEMIS in the Department of Defense. Rosters of membership of FCST committees, and a listing of the reports prepared by each in 1968, is appended.

(The report can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, Price: 25 cents).

47. "Long Range Forecasting Methodology", (AD 679 176), A Symposium held at Alamagordo, New Mexico, 11-12 October 1967, 191 pp.

"These proceedings of the Second Symposium on Long Range Forecasting and Planning contain the papers which were presented and the discussion of those papers". The titles and authors of the presented papers are:

(1) "Delphi" - N.C. Dalkey

(2) "Unsolved Problems in Selecting Experts in Planning and Long-Range Forecasting" - C.W. Taylor

(3) "Demographic Projection Techniques" - D.S. Akers and R. Irwin

(4) "Technological Forecasting and Its Role in Planning" - H.Q. North

(5) "The Mirage Studies and Some Implications" - H.A. Linstone

(6) "Long-Range Projections of Labor Force" - D. F. Johnston

(7) "Anticipating Socioeconomic Consequences of a Major Technological Innovation" - J.A. Hacke, Jr.

(8) "Numerical Weather Forecasting Techniques" - G.D. Hamilton

(9) "Technological Forecasting in Military Planning" - M.J. Cetron and D.F. Smith

(The report can be obtained from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, Price: $3.00).

48. Mansfield, K., "McElroy: First Priority is NSF Budget", Scientific Research, v. 4, no. 15, 21 July 1969, pp. 18-20.

This article presents an interview with the new director of the National Science Foundation (NSF), W.O. McElroy. The topics covered in the interview include NSF's future role, funding problems and prospects, project and institutional grants, and military research. McElroy feels NSF's central role is to support basic research and graduate training. NSF is "now supporting about 17 percent of the basic research, and certainly that should go up to 35 percent in a reasonably short time [3 years], if we can really convince people that there is a job to be done in maintaining this relationship with the universities". Some support of applied research for social problems is contemplated, but "I don't see that the NSF will be doing a lot of this". A specific problem is the question of the form in which universities are to be supported (project vs. institutional grants): there "needs to be some way of funding directly" that can be used "to support the overall scientific program". With respect to military research, McElroy is "very much against secret research in a university" but approves of unclassified research.

49. "NIH and NSF to Coordinate Research", Scientific Research, v. 4, no. 17, 18 August 1969, p. 13.

"Representatives of the National Institutes of Health and the National Science Foundation will meet for informal talks this month to discuss how to avoid either gaps or overlaps in the combined research of the two agencies during the current fiscal year. Because of President Nixon's call last month for a $3.5-billion reduction in federal spending, both agencies face limitations and are therefore looking for ways to get the most out of their research dollars". A "decrease in biomedical research programs, and a decline in the member of individual grants over the next three fiscal years" is predicted by an NIH official. The "policy of the 1950s to give support to biomedical research with relatively few budgetary restraints 'has been replaced ... by one of mild skepticism of the value of research ... whose payoff may be years in the future'". 'The problem in the training area ... is very acute since actions taken now will be reflected in the availability of research manpower some five to eight years hence'".

50. Nelson, B., "HEW Security Checks Said to Bar Qualified Applicants to PHS", Science, v. 165, no. 3890, 18 July 1969, pp. 269-271.

"Among many government officials the Department of Health, Education and Welfare (HEW) has the reputation of running one of the most rigid security operations". It has recently been "learned that qualified young doctors were being barred

from commissions in the Public Health Service [PHS] on the basis of security investigations". The article is primarily devoted to the case of one physician, Henry S. Kahn, who after being selected by the PHS for sponsorship for a commission, was rejected on the basis of a governmental security check, which indicated anti-Vietnam war views. "The threat that political considerations may bar some qualified applicants from PHS commissions is troubling to some medical people, especially to young doctors and medical school students who are opposed to American participation in Vietnam". "It is impossible to determine precisely what proportion of qualified applicants for medical, scientific and engineering positions in the PHS are turned down on the basis of information developed in the HEW security check". However, there "are certainly grave questions about the desirability and constitutionality of governmental practices by which anonymous officials use secret information and undisclosed criteria to deny someone a job in a non-defense-related field".

VII SCIENCE, FOREIGN AFFAIRS, AND NATIONAL DEFENSE

26. "Strategy and Science: Toward A National Security Policy for the 1970's", Hearings Before the Subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, U.S. House of Representatives, Ninety-first Congress, First Session, March 1969, 283 pp.

The Subcommittee held a series of hearings "on the general subject of the effect of space and weapons developments on U.S. foreign policy, with particular stress on the Nation's alliances and other security commitments abroad". The report of these hearings notes that as "the progress of science tends to outdistance our thinking and our political structures, two serious problems result: First, science may become the master instead of the servant of policy" and second, scientific progress "may make possible new ways of accomplishing objectives which are rejected because they do not fit into the framework of established patterns or organizations". Witnesses providing testimony include C.M. Herzfeld, Herman Kahn, G.B. Kistiakowsky, E.V. Rostow, T.C. Schelling, J.B. Wiesner, and Mason Willrich.

(The Hearings can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402).

27. Rivkin, S.R., Technology Unbound: Transferring Scientific and Engineering Resources from Defense to Civilian Purposes, Pergamon Press, 1968, 102 pp.

The problems and prospects of adjusting to lower defense expenditures and the redirection of these resources to unmet civilian needs are examined. The first chapter deals with the interrelationships among science, defense and the economy; the second with the problems of reduced military spending in terms of its impact on industry, on scientists and engineers, and on communities; the third with areas of needs and opportunities (urban environment, transportation, health, oceanography, and space) to which the released resources could be applied; and the fourth with an appraisal of the prospects for adjustment. "Only by finding new targets for public and private concern can the process of reallocating resources be successfully completed. Civilian purposes as clearly defined and strongly felt as is defense today will be essential to provide the stimulus and the target for technology freed from defense objectives".

28. "Senate Gets New Defense R&D Probers", Scientific Research, v. 4, no. 16, 4 August 1969, pp. 11-12.

A five-man subcommittee, set up by Sen. John C. Stennis (D-Miss), when he took over as chairman of the Senate Armed Services Committee, has been "directed to examine military r&d authorizations and was given the authority to initiate legislation. Officially, the subcommittee was established for the duration of the 91st Congress only, but the feeling in Washington is that it will become a permanent part of the Senate scene". The formation of this subcommittee led "to a proposed $1-billion cut in the $8.4-billion Defense Dept. r&d budget for fiscal 1970. It also led to an equally surprising recommendation of the Senate Armed Services Committee -- a Committee usually sympathetic to the Pentagon -- that research on chemical-biological warfare weapons be halted, and that r&d on CBW be limited to defenses against such weapons". The subcommittee, headed by Thomas McIntyre (D-N.H.), "has spent most of its time on the hottest issue currently before the Senate -- the ABM system", but would also like "to delve more deeply into the question of whether the Defense Department should continue doing pure research and studies in the area of social science". Prospects for the future of the subcommittee are discussed.

29. Langer, E., "U.N.: Experts' Report on CBW Supports Disarmament Effort", Science, v. 165, no. 3889, 11 July 1969, pp. 163-164.

The contents and recommendations of the recently released United Nations Report on chemical and biological warfare (CBW) are presented. "In its overall aspects the report discusses the characteristics of CBW, its probable effects on protected and unprotected military personnel, environmental factors affecting its use, its long-term effects on human health and ecology, and the economic and military-security consequences of the development of CBW arsenals. The experts did not address themselves to problems related to CBW disarmament, believing that they had laid the technical groundwork for such discussions among the political and legal authorities of their respective nations". The report, prepared by an international committee of 14 scientific authorities, was accompanied by three recommendations from the Secretary General, U Thant: (i) "To renew the appeal to all states to accede to the Geneva protocol of 1925"; (ii) "To make a clear affirmation that the prohibition contained in the Geneva protocol applied to the use in war of all chemical bacteriological and biological agents (including tear gas and other harassing agents) which now exist or which may be developed in the future"; (iii) "To call upon all countries to reach agreement to halt the development, production, and stockpiling of all chemical and bacteriological (biological) agents ...".

30. Charpie, R.A., "Technological Innovation and the International Economy", Science Policy News, v. 1, no. 1, July 1969, pp. 1,2,4-6.

Technological innovation is discussed with respect to its role in economic growth, its international aspects, its origin and environment, and differences between the USA and Europe that favor innovation. "Every ... study has shown that more than half of the overall growth in national or international product ... can be attributed to ... innovation". Because of the innovative performance of wealthy nations, the gap between the 'haves' and the 'have nots' is broadening at an increasing rate. As to the origins of innovations, Charpie notes that most of those of "great economic impact" do not come from "sophisticated scientific discoveries", nor from large companies where most of the R&D dollar is spent, but instead from independent inventors. Basic inventions "have come from throughout the world" but "have been brought to full fruition" as innovations in only a few countries where the "environment for innovation" is suitable. The US, contends Charpie, has a better environment than Europe, not because of a "large unified market" or government support of R&D, but because of the "personal and financial recognition" that "technological entrepeneurs" receive: 'entrepreneurship' breeds 'entrepreneurship'. It "is only in this area ... that the United States is decisively better endowed than the other nations of the world".

(Science Policy News is a bimonthly bulletin published by the Science of Science Foundation in collaboration with OECD; it replaces the SSF Newsletter and the OECD Science Policy Information Bulletin. For subscription, write the Science of Science Foundation Ltd., c/o The Ciba Foundation, 41 Portland Place, London W1. Annual subscription: $8.00).

31. "There is a Gap", Nature, v. 223, no. 5209, 30 August 1969, pp. 878-879.

The fourth in the OECD's series of reports on technology gaps between the organization's members deals with the pharmaceutical industry. The report concludes that "there is a gap between the American companies and most European companies, at least as far as the discovery and development of new drugs are concerned". "In all the European countries covered by the report, the United States was the chief supplier of important new drugs, with Switzerland next. Out of the 138 new drugs marketed since 1950, 67 originated in the United States, 20 in Switzerland and 15 in Germany. The US companies employ fewer research workers than all the European companies put together, but US expenditure is ... substantially higher than all the other OECD countries except Switzerland". In 1965 the US spent $365 million on pharmaceutical research, while Britain spent

$32.5 million; Switzerland, however, spent about $20 million at home and reputedly twice that sum abroad (the report classifies expenditure by location, not by ownership of individual companies), which indicates a "real expenditure in 1967 of about 5% per capita". "If the gaps between the United States and Swiss industries and the rest are not to widen, the European nations will have to go further towards harmonizing their drug laws", in order to create "a single home market comparable in size and importance with that enjoyed by the American companies".

32. Jequier, N., "Technological Gaps in the Computer Industry", OECD Observer, no. 40, June 1969, pp. 31-37.

The existence of marked technological gaps among OECD countries in the computer industry is discussed with respect to yardsticks for measuring the gaps, the causes, and the long term implications. Indicators of the computer gap include computer production, licensing agreements, innovative performance, foreign trade or foreign investment. "All the available evidence points to a clear-cut lead of the United States over other OECD Member countries"; "American companies and their foreign subsidiaries account for approximately 95 percent of the Western world's production of computers". The causes of the technological gaps "are the manifestation of certain deep-rooted differences which go far beyond simple industrial performance". Two of the most important of these are differences in management ability and differences in the level of government support. As for the long-term implications of the gap, the article notes that the "pace of technological change is determined by the United States", "American subsidiaries are a significant factor in the computer industry of Western Europe", "Markets are growing very rapidly and technology is still far from maturity", and software, rather than manufacturing, is "the most important segment of the industry". Possible actions toward closing the gap suggested by the report include concentration "on those fields where entry costs are lower and opportunities more numerous"; government support to "help some of the best national firms penetrate the key American market"; direct subsidies from government in the form of R&D grants and preferential procurement; and government support for the training of computer specialists.

33. "U.S.-French Scientific Cooperation", Science, v. 165, no. 3893, 8 August 1969, p. 570.

"Presidential Science Adviser Lee A. DuBridge and French Minister of Scientific Research F.X. Ortoli will exchange visits this fall to discuss development of new fields of scientific cooperation. The U.S.-French exchange was

proposed in discussions during President Nixon's visit with General de Gaulle in Paris earlier this year. The exchange marks the first time in 5 years that bilateral scientific talks between France and the United States will occur on a ministerial level. The two science representatives are expected to discuss possible new fields of cooperation in such areas as environmental and urban research, and to review ongoing cooperation in space, oceanography, medical and biological research, and education".

VIII SCIENCE POLICY IN FOREIGN COUNTRIES

International

124. Richardson, J., "Unesco: Super-Ministry with Problems", Science Journal, v. 5a, no. 2, August 1969, pp. 7-8.

> "As the UN Development Decade goes out with something of a whimper, awkward questions are being asked -- within and without the UN -- as to what went wrong". This brief article cites some of Unesco's successes, but concentrates on its failures and some of the probable causes for them. The successes cited include the launching of such projects as the International Geophysical Years of 1957-58 and Quiet Sun Years of 1964-65; the creation of ICRO and IBRO, the international organizations for cell and brain research respectively; the promotion of the International Hydrological Decade and the Intergovernmental Oceanographic Commission. "But Unesco's flaws appear mainly 'in the field'". Some of these flaws include: Unesco's position in engineering is less strong than in science; the developing countries prefer and demand the kind of science which is "unrealistically" related to its needs, e.g., runways for jet transports when training in literacy is needed. However, some of the causes of "Unesco's failings are not its own doing", for example, lack of financial support, difficulty in recruiting experts who are "willing to bury themselves geographically, culturally and often professionally for a year or two", and, although science planning in certain areas may be premature, it "goes on, just the same".

125. "Bilateral Institutional Links in Science and Technology", No. 13, Science Policy Studies and Documents, Unesco, Paris, 1969, 98 pp.

> This report is a "survey and analysis of the existing extent of co-operative links in the field of science and technology, between advanced and developing countries" and, in addition, it makes "proposals for promoting the wider introduction of such arrangements". Based primarily on questionnaires, the study covers details of several hundred current bilateral institutional links. A selected list of several hundred bilateral institutional links involving universities, research institutions, museums, private enterprises and co-operative industrial research associations is presented, which includes the linking institutes from the developing country and the advanced country, and the subject field. (This "list is not presented as comprehensive; its purpose

is rather illustrative"). Other topics covered include: bilateral institutional links combined with United Nations activities, role of non-government organizations, advantages of institutional links, Unesco's programme for promoting institutional links, "Industrial research associations: their potential contribution to overseas development", "Bilateral aid for development", and "East-West co-operation in academic aid to developing nations".

(This report can be obtained from the Unesco Publications Center, 317 East 34th Street, New York, N. Y. 10016).

126. "Purpose in Europe", New Scientist, v. 43, no. 659, 24 July 1969, pp. 171-172.

A recent report prepared for Jean Monnet's Action Committee for a United States of Europe, proposed the creation of an institution which would make possible collaboration in European science and technology. It "would give the whole business a sense of steadfast purpose, overriding the national interests which at present have the upper hand in deciding policy and projects". The institution would be "linked with the general political institution of the (EEC) commission"; it "would need a long-term budget, and should work out a long-term programme as soon as possible. To start with, its ambitions would need to be limited. Its initial task would be first to secure the removal of national barriers which restrict industry, and the alignment of different patent laws and different standards of health and safety; and second to encourage collaboration among government and public authorities". "The institution's aim would be to build up a reputation that would enable it gradually to expand its influence and authority in European industry and technology. If it were successful ... it could extend its role, for example towards pooling European resources in aeronautics and space, oceanography, nuclear technology, biology and pharmacy, and medicine. It is now generally agreed that Europe needs some sort of international agency, or agencies, to help coordinate its science and technology activities, to reduce the multiplication of effort, reap economies of scale in production, exploit a larger market, and stand up to American competition".

127. "Boost for Eurotech?", New Scientist, v. 43, no. 657, 10 July 1969, p. 51.

"Unpleasant though it was, the Rhine pollution scare may at least have given the Continental countries a much-needed push towards co-operation in science and technology". Recently, the "Council of Minister of the European community (the Six) approved in principle the proposals of the Aigrain report for 47 co-operative projects in seven priority fields of science and technology. Pollution (of air and water, as well as that

caused by noise) was one field. The others covered automatic data processing, telecommunications, new means of transport, oceanology, meteorology and metallurgy. The report is now being submitted to further scrutiny, to see which of the projects should be given priority, and the conclusions are due to be prepared by 1 October for consideration at a later ministerial meeting. At that stage a formal approach can be made to other countries -- notably Britain -- for participation, although these countries have known unofficially what is in the report for some time". "The 47 projects span a wide range, from matters like meteorology and standards, to the design of a large computer for the 1980s, and a feasibility study of a hovercraft". Several of the projects that are now being conducted by the member countries are discussed, and emphasis is placed on their limited scope. "It is high time that concerted action was extended to other fields in Europe. The barriers of different political institutions, company laws, taxation systems, and so on, are not insuperable -- given the will to surmount them".

128. "ESRO Makes Plans", Nature, v. 222, no. 5200, 28 June 1969, p. 1218.

ESRO's Scientific and Technical Committee has recommended that it should go ahead with two projects -- a cosmic ray satellite launched into a polar orbit and a geostationary satellite designed to study solar-terrestrial relationships. "The particular decisions that have been made ... are less important than the spirit in which the decisions seem to have been arrived at. At the end of the ... meeting, nine of the ten governments represented voted in favour of the decision. Only the Belgian representative abstained". "ESRO is already assured of the funds needed to support the two new satellites between now and 1971, but it would at some stage be necessary for the council to supply the money needed to complete the project by 1974 or even 1975". The remainder of the article briefly describes the two satellites and discusses the European governments plan "to devise a joint programme for ELDO and ESRO".

Brazil

129. "Brazil", Nature, v. 223, no. 5202, 12 July 1969, p. 124.

"Although there have been no further dismissals of Brazilian academics since the publication of two lists of people on April 21 and April 30, there has so far been no relaxation of the government's pressure on the universities". Consequences of the government's actions are briefly discussed:

"One immediate consequence ... has been to unsettle those unaffected by the decree, with the result that many of those still holding positions in Brazil hope soon to move elsewhere. The view ... is that there seems no immediate prospect that the statutes which have made the repression of the universities possible will be amended in the near future although it does seem possible that external pressure may soften the rigour with which the statutes are applied". "A more serious problem than the sacking of university teachers may be the effect of the legislation on students". At present, "students who are expelled from universities for political reasons will be unable to complete their training". It has been recommended that scholarships be provided "to enable them to complete their courses elsewhere". The remainder of the article discusses the legislative provisions allowing the government to enforce the statutes, and the difficulty in obtaining accurate information "about the application of these decrees" because of press censorship.

Canada

130. "OECD Blasts Canadian Science Policy", Scientific Research, v. 4, no. 16, 4 August 1969, p. 16.

An OECD (Organization for Economic Cooperation & Development) study of Canada's science policy concludes that Canadian R&D follows a 'day-to-day pragmatism' rather than a 'coherent national design'. The study, which is to be published by the end of 1969, "praises the high quality of individual Canadian research" but strongly criticizes its management. Criticism is aimed also at the lack of coordination of university research, and at the slowness with which scientific discovery is translated into technical innovation. "The report suggests a number of institutional remedies, the most controversial being the appointment of a top-level science administrator ... whose main job would be the planning and implementation of national science goals"; the minister, who would act as an impartial 'custodian of an innovative society', "would report directly to the Canadian prime minister and serve as his special adviser on science". Other OECD recommendations include "a new independent science policy council", "a central scientific secretariat to act as a clearinghouse of data and statistics on research and economics", and "a Cabinet committee on science policy, chaired by the science minister, to make policy decisions". In responding to the OECD study, "Canada's reigning 'science czar', C.M. Drury", reported that the proposal for a science minister is being discussed, and that the existing policy-making machinery was adequate but did "need revitalizing".

131. "Proceedings of the Special Committee on Science Policy", First Session, Twenty-eighth Parliament, Nos. 46-62 (May 1969-June 1969), Queen's Printer and Controller of Stationery, Ottawa, Canada, 1969.

These hearings, held in May and June 1969, are a continuation of the efforts of the Canadian Senate to study Canada's science policy, "with the object of appraising its priorities, its budget and its efficiency". Organizations presenting testimony in this series of hearings include universities, educational associations, provencial research councils, technical societies, medical colleges, Social Science Research Council of Canada, Canadian Construction Association, and special technical institutes.

132. Polanyi, J.C., "Assessing the Role of Basic Research in Science Policy", Science Forum, v. 2, no. 3, June 1969, pp. 25-29.

This report reviews the current status of the recent debate on national science policy in Canada and analyzes the nature of, and implications for, basic research in science policy. The author discusses the issues raised by the central question concerning society's support of science: "do we have ... means by which we can direct basic science more effectively toward the solution of specific problems of practical interest?". Examples of basic science and technological applications are given and their respective values to society are described. Polanyi presents the elements of science planning, analyzes the need for identification of the "growing points of real promise" in the planning of science, and points out the "applications of basic science are extraordinarily difficult to predict". "Where basic science is concerned, the problem of assessing utility in terms of future benefits to the economy is a hundred times more difficult" [than] "the simpler task of picking tomorrow's winning devices from today's technology". The author concludes by emphasizing the need for more significant basic science: "It follows that basic science serves society in the best possible way by doing the thing that it is, today, most often reproached for: applying the standards of science to science".

133. "Gloom in Canada", Nature, v. 223, no. 5208, 23 August 1969, p. 766.

The Science Council of Canada recently published its third annual report assessing Canadian "scientific and technological resources, requirements and potentialities" and making recommendations. The report records that "gross expenditure on [R&D] in Canada has been ... 1.3 to 1.4 percent of the GNP". The "council concludes that during the financial year 1968-69 the percentage rose to only 1.47 percent, and ... the target of 2 percent seems as far away as it did five years ago". "Failure of federal government incentives is made the scapegoat for the depressing level of industrial" R&D, and unless

this changes, "direct federal support for industrial" R&D will have been static for five years. "The council recommends a target date of 1973 for the achievement of a [R&D] expenditure running at 2 percent of the GNP. The programme outlined is for industrial" R&D "to increase by 20 percent each year, university" R&D "to increase by 22 percent per year until 1970, and then to drop slightly, and" R&D "by the federal government to increase by a steady 11 percent each year". Some of the major projects for boosting R&D include: "development of the north; oceanography; and weather prediction, modification and control". "Expenditure is expected to be several millions of dollars per programme per year during the" R&D phase, "reaching hundreds of millions per year when any engineering work starts".

134. "Scientific and Technical Information Proposals", Science Policy News, v. 1, no. 1, July 1969, p. 7.

A recent report from the Science Council of Canada ("Scientific and Technical Information in Canada", Special Study No. 8, 1969) examines the country's needs in this area. The report contends that the cost of such information "comes to several hundred million dollars a year, but duplication and unused data threaten to price scientific and technical information beyond national means to recover and apply it". "After a review of Canadian information systems, and a brief survey of systems operating in other countries and in international organisations, the proposals, 'Toward a Canadian Solution', include: a national referral centre to aid all sectors, especially industry; a clearinghouse to ensure the provision of STI documents, national from international; a more effective 'lending' service; changes in structure and functions of existing libraries; reorganisation of government libraries; improved information services for industry; establishment of 10-15 automated information centres during the next five to six years; information systems research; improved education and training; and a focal point to deal with international information problems. Two major recommendations are that a national Scientific and Technical Information Agency be set up and that one Minister be made responsible for all government activities in this field".

135. "Getting the Balance Right", Nature, v. 223, no. 5206, 9 August 1969, p. 560.

"The National Research Council of Canada, like grant giving bodies elsewhere, seems to be going through a period in which it questions the basis on which it provides support for the universities. The report of the president of the NRC for 1968-69, now published, says that the council is considering whether it should replace the present system of awarding annual grants by one in which investigators in the universities would be given three years' money at a time. In the year just

finished, the council spent $38.5 million on research grants to the universities, all but $7 million of it for the operation of research programmes. In addition, the council spent $20.8 million on the support of university research by means of scholarships and fellowships ($9.9 million), central research facilities ($4.9 million), computer facilities ($3.8 million) and activities such as the organization of conferences and subscriptions to international bodies ($2.2 million). The council says that the university support programme has grown to the point at which its size makes the granting of annual money for research projects almost a physical impossibility. Taking a leaf out of the book of the National Science Board in the United States, the council is also discussing the possibility of 'core grants' to universities for supporting postdoctoral fellows. For graduate students, the council is considering whether to abandon the practice of including stipends in research grants". "A survey which has been carried out in the universities suggests that there should be a doubling of the total expenditure on university research of 1968 by 1972, by which time the total cost of Canadian university research should be $250 million".

136. Maule, C.J. and I.A. Litvak, "Federal R&D Incentives: Are They Needed? Are They Adequate?", Science Forum, v. 2, no. 4, August 1969, pp. 21-23.

Recent international comparisons of R&D expenditures have been interpreted as indicating that Canada's industrial research activity is too small, and that incentives and assistance should be provided to increase industrial R&D. The author contends that "the statistics of international comparisons ... have been misinterpreted" and misapplied in the case of Canada, and that account must be taken of the important role the multinational corporation plays in Canada. With respect to the author's first contention "Canada cannot be compared directly to other countries on this basis [R&D as a proportion of GNP] due to the extent of American investment in Canada and the consequent access that subsidiaries of U.S. corporations have to the results of American" R&D. The "extent of American investment places Canada in an almost unique position which permits Canada to use imported technology to a degree unattainable by any other country". The additional payments for imported technologies (royalties, license fees, and profits), "may well understate the amount of research actually received" from the U.S., in which case the R&D percentage figure would be higher. With respect to the author's second contention, if "the Canadian R&D incentives are to prove effective, more multinational corporations will have to implement the principle of international specialization, and Canada must be a part of this modus operandi". "In short, the effectiveness of the Canadian R&D incentives will largely depend on the total operations of the multinational corporation". Although most multinational companies have "internationalized the production

operations of their facilities", "few have ... internationalized their [R&D]". In conclusion, the author cites "a number of ... outstanding factors that tend to suggest that the Canadian programs provide insufficient incentive [to industry] to achieve their intended effect".

137. Cook, L.G., "Technological Innovation for Economic Growth: No Magic Wand", Science Forum, v. 2, no. 4, August 1969, pp. 25-26.

The author discusses "technological innovation for economic growth" with respect to the general problems, problems specific to Canada, and prospects for a solution to Canada's problems. Success in technological innovation "requires shrewd planning, careful management, courage and elbow grease -- 5 to 15 years ahead of time! This is an unusual combination of scarce items at national levels". With respect to Canada, there are some special problems: (1) "How to prevent certain primary foundation industries from actually sliding downhill or even disappearing, and how to get in on the industries that may replace them"; (2) "How to induce a healthy development in Canada of a class of industry that almost does not exist now -- high growth rate 'function' industries" -- "the Canadian economy still is heavily based on raw materials". In addition, "some 60-70% of the significant industry in Canada today consists of branch plants of larger U.S. firms ... [which] suffer from ... disadvantages such as ... a much smaller market ... [and] ... tariff barriers". The author contends that the "key is a unity of purpose, dedicated co-operation, and courage". It will be necessary: (1) "to take a firm resolve at federal government level ... that some drastic changes in fiscal and economic ground rules and policies will have to be faced", and (2) to bring together "economic thought, fiscal thought, business thought and experience, and technical thought ... for the common goal".

Cuba

138. Ryder, W.D., "Politics of Science in Cuba", New Scientist, v. 43, no. 664, 28 August 1969, pp. 436-437.

"Cuba presents an interesting case of the development of scientific institutions under a revolutionary socialist regime in a backward country". The author, who spent four years as head of the department of entomology, Institute of Animal Science in Havana, states that "[s]ince Fidel Castro came to power ... science has enjoyed increasing government backing. This stems from a desire for genuine emergence from underdevelopment. The introduction of universal education and

the expansion of the universities have occurred as parallel phenomena. A remarkable proportion of the country's slender resources has been allotted to improvement of research centres and founding of new ones". "One of Cuba's gravest problems in science is that of education. Teachers are in desperately short supply". "Up to the present, research effort has been too diffused and unorganized. There has been a tendency for each scientist to work on his own individual project; while projects have not been examined carefully ... to see whether they were likely to be of practical value". The remainder of the article describes the two main bodies concerning themselves with scientific research and discusses Castro's concept of the place of science in society: science and politics are "inseparable", and his function is "to ensure that scientists did not form an elite whose pursuits ignored the requirements of the community as a whole".

Denmark

139. "Engineers Suggest Ministry of Science and Technology", Science Policy News, v. 1, no. 1, July 1969, p. 7.

"The Danish Association of Graduate Engineers (DIF), in a report on the future of Danish technology, proposes the establishment of a Ministry for Science and Technology. It points out there is no suitable body to ensure co-ordination of technological development in co-operation with government, parliament, research institutions, and industry, and there are no possibilities of contributing politically towards such development. As a first result of this report, the Government has begun discussions between representatives of industry, science, and government to focus on liaison problems between industry and research, and to find out how government can contribute towards their solution".

East Germany

140. Ford, B.J., "Technological Rebirth in the GDR", New Scientist, v. 43, no. 662, 14 August 1969, pp. 338-339.

The efforts being made by the East German government (GDR) to bridge the gap between universities and industry, both in education and in R&D, are discussed. For "some time there has been an extensive programme of modernization designed to equip the student for his role in society and also intended to bridge the gap between the colleges and the industrial sector. The GDR's university output has been expanding rapidly. The number of graduates went up three-fold between 1950 and 1960, for example;

in 1965, 129 out of every 10,000 people were students and the target for 1970 is 150 per 10,000. Tuition methods have been changed ... [and] a series of new principles was generally adopted which ensured a broad-based education for the science student". The article describes the new curriculum and gives several examples of new cooperation between universities and different industries. "The aim of the communist government in the GDR is therefore clear. The government intends to make the university and college departments more easy to coordinate and control, and to facilitate the cooperation between the students and the industrial sector which will eventually employ them. Thus the disparity between educational criteria and those of employment, at least in the technological sphere, becomes narrowed. Though it will take time to assess the results, the indications so far are clearly in favour of widespread benefits all around".

France

141. "Pompidou Upsets French Scientists", Scientific Research, v. 4, no. 15, 21 July 1969, p. 13.

Recent reorganization of France's scientific research is viewed by some French scientists as "slighting basic research". President Pompidou has "merged the Ministry of Scientific Research & Atomic & Space Affairs with the Ministry of Industry to form the new Ministry of Industrial Development & Scientific Research". "Most observers say that that action reflects the government's intention to give priority to applied research -- or to research that may give an immediate boost to the economy -- over basic research". The possible organization within the new Ministry is discussed. "The National Scientific Research Center, which is responsible for most of France's basic research, will continue as part of the Education Ministry". "The office for scientific & technical research, which promotes the industrial application of research, might also be moved to the new Ministry, along with the office ... which directs the French computer-development program, 'Le Plan Calcul'".

142. Greenberg, D.S., "Concorde: The Costs Are Rising, But So Are Prospects for Success", Science, v. 165, no. 3891, 25 July 1969, pp. 374-377.

After a "chronicle of crises" that stretches through the nearly 7-year old Concorde project, its makers -- BAC in Britain and Sud Aviation in France --- "are expressing moderately plausible confidence that the controversial craft will turn out to be neither the financial nor the acoustical disaster that its opponents have long claimed it would be". The development costs

will be $1.7 billion -- more than double the figure announced just a few years ago. "Currently under production are two prototypes, and work has begun on three full-fledged commercial models that ... should go into regular service in May 1973. Though no airline has committed itself to buy the Concorde until the testing is much further along, options for a total of 74 planes have been taken by 16 major airlines". "The planes are expensive ($21.5 million ... plus $2.5 million for spare parts) ... [b]ut the indications are that the manufacturers are going to meet the specifications that they promised ... Concorde will be able to carry approximately 110 passengers from London to New York in under 3-1/2 hours". The remainder of the article discusses the test flight schedules, and presents a brief history of Concorde's genesis.

143. "Scientific Affairs Service in Foreign Office", Science Policy News, v. 1, no. 1, July 1969, p. 8.

"A Scientific Affairs Service has been established in the General Directorate for Cultural, Scientific and Technical Relations of the Ministry for Foreign Affairs. This will cover space questions, data processing, oceanography, relations with international organisations in the field of science, and exchanges of documentation. M. Jacques Martin, Minister Plenipotentiary, has been appointed head of the Service under the authority of M. Laurent, Director-General of Cultural, Scientific and Technical Relations. The Service will bring about a unification of management and control, which will enable the Minister for Foreign Affairs to be responsible ultimately for all external negotiations, including those of a specialised character. This should avoid the necessity of creating external relations services in each individual administration or scientific organisation".

Italy

144. "Chaos Strikes Italian Physics", Scientific Research, v. 4, no. 16, 4 August 1969, pp. 13-14.

"Italian nuclear physics research has been reduced to chaos by the country's political crisis". "Almost all research laboratories run by the government Committee for Nuclear Energy (CNEN) are in some stage of paralysis because of wrangling over who should fill the major CNEN jobs". "CNEN's steering committee should have been appointed at the beginning of the year, but the three-party coalition government could not agree on the committee's political makeup. With the recent collapse of the coalition government, the outlook is that the standstill will continue until fall". "The

National Research Council, the government body that has prime responsibility for basic research in fields other than physics, is also affected by the government crisis, and, like CERN, has been limping along with an interim administration since the beginning of this year". "Of all the research effected, nuclear physics is the hardest hit. The National Institute of Nuclear Physicists, a professional body, warns that the paralysis in CNEN labs will have disastrous consequences for research".

Japan

145. "Another Rocket", Nature, v. 222, no. 5200, 28 June 1969, p. 1223.

The Director-General of the Science and Technology Agency has recently announced that "Japan is to have a long-range space development programme" "with clearly defined targets established". Consideration "is to be given to the creation of a central agency to coordinate and revise Japan's scattered space development projects". "Meantime, another Japanese Government agency has announced that a Japanese experimental communications satellite is to be built for launch in 1973. The Ministry of Posts and Telecommunications will be responsible for the design while the Science and Technology Agency will handle the launch method and provide the rocket hardware. As a preliminary, work is being carried out on an ionospheric satellite for launch in 1971". "In support of the satellite communications programme, a Space Development Corporation is to be set up to look after matters relating to satellites for practical purposes. It will start with a staff of 150 drawn from current teams concerned with rocketry and radio research. Japan has had individual views at the year-long Intelsat negotiations. Basically, it favours permanent arrangements for Intelsat but considers that the international organization's influence should be limited".

146. "The Japan Techno-Economics Society", Science Policy News, v. 1, no. 1, July 1969, pp. 10-11.

The Society, established in 1966 with support from government and industry, conducts studies "to determine the direction of technological innovation and to provide a view of the future". Research studies are carried out by the Society through the following study committees: "(a) Committee on Futurology endeavours to draft a plan for the future, by investigating developments in the field of science/technology ... and debates among different specialist groups. (b) Committee on Development of Engineering Ability does research on how the development of engineering ability can best contribute

to the establishment of a self-reliant technology in international competition under a system of open economies, and what should be a strategy for its practical application. (c) Committee on Information Innovation seeks answers to problems such as the current status and position of computer systems, theory of value information, and the future and social influence of computers. (d) Committee on Science and Technological Policy reviews national contributions to the promotion of technology, and investigates the problems of science-technology education".

Switzerland

147. "Science Council Activities", Science Policy News, v. 1, no. 1, July 1969, p. 12.

This brief item summarizes the activities of the Swiss Science Council during 1968. The "first phase of the Council's efforts to develop a Swiss science policy" was completed. A federal law on aid to universities was approved, which "created the financial basis essential for a major extension of university education in the Cantons". "Important measures to promote research include: agreement in principle to participate in the CERN project for a large accelerator; and, following Swiss initiative, an agreement setting up the European Conference for Molecular Biology was proposed. Moreover, the Science Council has made fundamental recommendations concerning continued participation in space research and technology. These decisions indicate the direction Switzerland will follow in the next few years in research in the various areas of big science. In the field of educational science, so far greatly neglected, the Science Council has recommended a concentration of forces and intensification of research". "Finally, the principal gaps in basic statistics have been filled, mainly through a full year's statistics concerning new students, overall statistics on final examinations, and investigations into research at the 'hautes ecoles', and the Federal and Contonal administration".

West Germany

148. "Slackening of Growth", Nature, v. 223, v. 5203, 19 July 1969, pp. 228-229.

"The expenditure of the West German Government on scientific research during 1969 has risen noticeably less than was predicted in the Federal Government's financial programme adopted in July 1967, according to figures released by the West German

Ministry of Scientific Research". "The funds actually allocated for scientific research this year are some DM 80 million less than had been foreseen in 1967. One of the explanations is that federal expenditure on universities and technical colleges has not risen as steeply as had been intended. Whether any modification of the overall scientific research programme will be called for in the light of the latest figures remains to be seen, but considerably more money will have to be earmarked for scientific research for the next two years to keep in line with the ministry's forecast of an average growth of expenditure of 16 per cent between 1968 and 1971". Tables are included which compare the actual expenditure with that envisaged in the 1967 program and another that shows how the Government's scientific budget has actually been divided between the different sciences and technologies.

149. "Patents and Licences Deficit", Science Policy News, v. 1, no. 1, July 1969, p. 9.

"In the patents and licences sector (excluding copyrights) the German Federal Republic's balance sheet in 1967 showed a deficit of DM 409 million. Although earnings were up from DM 293 million to DM 359 million over the previous year, expenditure rose in the same proportions, from DM 701 million to DM 768 million. In 1967, 48 per cent of the Federal Republic's expenditure on foreign patent rights and licences went to the United States (38 per cent in 1963) and 27.6 per cent to Switzerland. The deficit on patent and licence transactions amounted to DM 293 million with the United States, and DM 201 million with Switzerland, DM 36 million with the Netherlands, DM 29 million with the United Kingdom and DM 5 million with France. On the credit side, the principal earnings from this source were DM 56 million from Japan, DM 29 million from Brazil, DM 23 million from Italy and DM 17 million from Spain. The chemical industry succeeded in further reducing its deficit from DM 98 million in 1966 to DM 65 million in 1967. At present, 70 per cent of the industry's expenditure on patent rights, inventions and processes is covered by earnings. The deficit in the electrical industry increased, and the metal manufacturing and processing industry also showed a deficit".

United Kingdom

150. "Space Division at Mintech", Science Policy News, v. 1, no. 1, July 1969, p. 12.

"The [UK] Ministry of Technology has set up a Space Division to integrate the work of the present branches dealing with